

State of Oregon  
Department of Environmental Quality

Memorandum

**Date:** March 29, 2016  
**To:** Eva DeMaria, USEPA  
**Through:** Scott Manzano, DEQ Northwest Region Cleanup Manager  
**From:** Alex Liverman, Portland Harbor Stormwater Coordinator  
**Subject:** Source Control Decision & No Further Action Determination  
Brazil Motors and Controls, Inc.  
ECSI # 1026

**1.0 Introduction**

This memo presents the basis for the Department of Environmental Quality source control decision and no further action determination for the Brazil Motors and Controls, Inc. site, located at 4315 NW St Helens Road in Portland, Oregon.

Brazil completed a Voluntary Cleanup Pathway Final Report (Terra Hydr, 2015) focused on the stormwater pathway at the site in accordance with the 2005 *EPA/DEQ Portland Harbor Joint Source Control Strategy*, also known as the JSCS. The report provides information on removal of soil to address the stormwater pathway as well risk to occupational workers, in accordance with Oregon Revised Statutes (ORS) 465.200 et. seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 through 115.

DEQ concludes from review of the Voluntary Cleanup Pathway Final Report and supporting documents in the administrative record that Brazil has identified and controlled upland sources of contamination from current and past operations such that contaminant transport pathways at the site do not pose a significant current or future threat to the Willamette River. Further, DEQ concludes that the site does not pose a significant risk to human health or the environment, and no further action is necessary.

**2.0 Site Description**

The Brazil site is located in an industrially zoned area of Portland, Oregon, near the intersection of NW St. Helens Road, NW Yeon Avenue and NW Kittridge Avenue, approximately 0.5 mile west of the Willamette River. The site covers approximately 1.44 acres comprised of approximately half steep wooded hillside at the lower edge of Forest Park. The developed half of the site includes north (approximately 4,250 square feet or 0.1 acre) and south (approximately 13,900 square feet or 0.3 acre) gravel lots on either side of a 10,600 square foot building. Historical aerial photos indicate equipment storage and vehicles in the outside lots at least since 1974, lessening in the 1990s, and that the north lot was empty by 2009 and the south lot was empty by 2012. Currently, the lots may be used for parking and the building is used for warehousing, retail and offices. The site location and developed layout are shown in **Figure 1**.

The wooded hillside includes a natural drainage feature that was redirected to a concrete channel along the site's south yard at some point in the past. A portion of the hillslope drainage still follows the former channel and currently flows in a depression through the site's graveled south lot, along a steeper planted area acting as a

demarcation of the topographic transition to a gentle slope toward St. Helens Road. The drainage from both the concrete channel and the on-site depression discharges into the City of Portland piped conveyance system through a trash rack and manhole at the edge of Brazil's property, south of inlet AMZ 188, as shown in **Figure 2**, which discharges to the Willamette River through City of Portland outfall 19. A short section of pipe is shown on **Figure 2** connecting to AMZ 188 from the direction of the south lot. This pipe was determined to remain dry during storm events and a camera scope terminated approximately 23 feet from the catch basin connection.

Stormwater interfaces with the site in several ways. Large volumes flow from the steep slopes of the park and forested areas, though the drainage to the city conveyance system. Rain falling on the site infiltrates in gravel areas or flows to the drainage or St. Helens Road catch basins either overland or from roof drains directed toward the street. A single catch basin was discovered at the end of a trench drain along the base of the steep, forested area behind the north lot, which directed captured flow to an underground pipe along the northern boundary of the site toward the street. No connection was found to the City conveyance system and frequent ponding on the site and areas of the immediately adjacent lot indicated blockage of the pipe.

While depth to groundwater at the site is unknown, the site is within an area underlain by Columbia River Basalt. Investigation at the adjacent site, Tax Lot 100 that was formerly owned and remediated by Portland General Electric, encountered shallow groundwater at approximately 22 to 28 feet below the ground surface (Wohlers 2013), which is assumed to be similar at the Brazil site.

### **3.0 Site and Regulatory History**

Historical records indicate that the lot was initially developed with the existing building in 1914 (Terra Hydr 2015). Known operations at the site include Portland Sandblasting and Skeen Electric prior to 1964 and work on and sale of electric and other motors and components as Brazil and Company 1964-1986, Brazil Electric Motors 1986-2004, Tatoosh Investments LLC 2004-2007 and Silver Star LLC 2007 to present.

As documented in DEQ's Environmental Cleanup Site Information (ECSI) database, the Brazil site was added to database in 1990, though insufficient information was available to determine whether the site posed a threat to human health and the environment and a preliminary assessment was recommended.

After Portland Harbor was listed as a Superfund site in December 2000, Brazil received and responded to a 104e request for information from EPA.

As part of Portland Harbor upland source control site discovery efforts in City of Portland outfall basin 19, the City collected and analyzed catch basin sediment and stormwater in City conveyances receiving stormwater originating on the Brazil site beginning in 2003 until 2012. The City sampling indicated that polychlorinated biphenyls or PCBs may have been discharging into the City conveyance system in site stormwater, at levels in exceedance of Portland Harbor screening level values. In 2010, Brazil entered into an agreement with DEQ to join the Voluntary Cleanup Program to complete a stormwater source control evaluation at the site.

### **4.0 Summary of Site Investigations, Actions and Evaluations**

#### **4.1 Contaminants of Potential Concern.**

Based on sampling of stormwater conveyances the site discharges to, site soil samples and historical operations, PCBs and metals were contaminants of potential concern for transport from the site, though polycyclic aromatic hydrocarbons or PAHs and phthalate esters were also evaluated in soils at the site.

## 4.2 Investigation and Remedial Action

### 4.2.1 Nature and Extent of Contamination

In 2006, the City of Portland conducted sampling of stormwater solids in stormwater conveyance lines and catch basins that serve St. Helens Road and multiple sites and are located adjacent to and downpipe from the site. In adjacent and downpipe samples, PCBs were detected in line solids ranging in concentration from 24 µg/kg to 679 µg/kg, dieldrin at 9.2 µg/kg to 47.1 µg/kg and DDx components at 3.7 µg/kg to 290 µg/kg. In downpipe samples, zinc was detected at 208 µg/kg, lead at 27 µg/kg, copper at 64.3 µg/kg, PAHs at 189.5 µg/kg and bis(2-ethylhexyl)phthalate at 549 µg/kg (City of Portland 2007, 2010).

In 2011, Brazil collected and analyzed shallow soil samples from the north and south gravel lots, from areas determined to be potentially erodible, as shown in **Figure 3**. PCBs were detected in the north lot at 6080 µg/kg and in the south lot at 255 µg/kg (Coles 2011). The following metals were also detected in shallow soils in the north lot: cadmium at 13,200 µg/kg, chromium at 115,000 µg/kg, mercury at 124 µg/kg, nickel at 100,000 µg/kg, selenium at 12,400 µg/kg and zinc at 938,000 µg/kg; and in the south lot: arsenic at 8,970 µg/kg and lead at 151,000 µg/kg (Coles 2011). These data are presented as samples SS-1 (north lot) and SS-2 (south lot) in **Tables 1 and 2**.

In 2014, a Phase II Environmental Site Assessment, funded by the City of Portland Brownfield Program, was undertaken at the site. **Figure 4** shows sampling locations, which included 13 direct push borings of soil in the gravel lots to a depth of four and a half feet below ground surface (excluding the top gravel cover which varied from 0 to 2 feet), one composite of six discrete shallow (0 to 0.5 feet) soil samples from the forested areas, one solids sample from the single catch basin located at the base of the forested area behind the north lot, and investigation of a conveyance line running from the catch basin along the northern property boundary toward the street. The results of this sampling are presented in **Tables 1, 2 and 3** and the terminus of the conveyance line was not able to be determined.

### 4.2.2 Risk Assessment

The shallow soil sample composited from the forested areas of the site did not show any appreciable concentrations of contaminants. Because these forested areas are segregated from the developed portions of the site by fencing, DEQ determined that access to contaminated areas of the site by terrestrial ecological receptors was prevented. Therefore, DEQ did not further evaluate risk to ecological receptors.

While samples between two to four and a half feet were not achieved comprehensively throughout the site, there were only a few detections of contaminants below two feet. These deeper detections were always less than the concentrations detected between zero to two feet, indicating that concentrations decrease with depth. Since groundwater likely occurs at depths of 22 to 28 feet below ground surface, decreasing contaminant concentrations below two feet and the limited ability for the contaminants at issue to readily transport between media make it unlikely that groundwater under the site would be impacted by soil contamination found on the site.

For human health risk from site soil, DEQ determined that only two soil samples (DP-2 and DP 4) from the Phase II work and one sample from Brazil's source control investigation (all in the north lot) exceeded DEQ's direct contact occupational risk-based concentration for PCBs of 590 µg/kg. The 2001 Independent Cleanup Pathway Report for the property adjacent to the northern boundary of the site (former PGE-Forest Park, ECSI #2406) used the residential risk-based protective level in DEQ's *Generic Remedies* guidance for PCBs of 1,200 µg/kg as the basis for a No Further Action determination. Only Brazil's north lot sample and Phase II sample DP-2, at the

northern boundary of the site with this adjacent property, exceeded this 1,200 µg/kg residential risk-based protective level.

In the south lot, the Brazil sample and two of the Phase II samples slightly exceeded the DEQ occupational risk-based concentration for arsenic, but these were at or below the Portland basin regional background concentration of 8,800 µg/kg.

Several of the site soil samples in the north lot exceeded DEQ occupational risk-based concentrations by up to two orders of magnitude for arsenic, cadmium and lead, and therefore presented risk to workers at the site.

#### **4.2.3 Remedial Action**

Because of the potential risk to workers from metals in the north lot, DEQ concurred with the Phase II report recommendation of removal of the top 18 to 24 inches of soil from an area measuring approximately 2,800 square feet or 0.07 acre of the north lot. DEQ also required confirmation of flow and connection from the stormwater conveyance pipe from the site or abandonment of it. In 2015, Brazil obtained a City of Portland Site Development Permit. Work under the permit included installation of erosion control measures, excavation of soil directly into trucks, transportation of removed soil to the Chem Waste Management facility in Arlington (depending on hazardous levels of lead) or the Hillsboro Landfill, securing of the excavation area while confirmation samples will collected and analyzed and cutting and capping at the property boundary with the street of the only existing stormwater line that runs along the northern edge of the property. Post-excavation soil samples were then collected at the same locations (DP-1 through DP-7) as the Phase II north lot borings and, following review of the analytical results, DEQ provided approval for a geotechnical barrier and approximately 22 inches of gravel backfill to be placed to cover the newly exposed soil at the bottom of the excavated area. Post-excavation confirmation sampling results are presented in **Table 4**.

Following this sequence of remediation actions in the north lot, concentrations of cadmium and lead on the now covered soil at the bottom of the excavated area no longer exceeded the DEQ occupational risk-based concentrations. While arsenic levels now under the geotechnical fabric and 22 inches of gravel continue to exceed the DEQ occupational risk-based concentration, they are consistent with background levels, with the exception of one point (DP-6) that exceeded the Portland basin regional background concentration of 8,800 µg/kg.

#### **4.2.5 No Further Action Determination**

Although sampling at the depth of excavation indicated three sample points exceeded the DEQ occupational risk-based concentrations for arsenic (DP-6) and for PCBs (DP-3 and DP-6), DEQ concluded that soil impacts above occupational risk levels are spatially limited. This, coupled with placement of an isolating geotextile layer and 22 inches of gravel in the north lot, gives DEQ confidence that the completed removal action is protective overall. Therefore, no further action is currently needed to address contamination in soils at the site. Future development on the site, however, should proceed in consideration of the small area of residual contaminants left on the site below the fabric and gravel layers.

#### **4.3 Source Control Evaluation**

Because the site is located within the Portland Harbor Superfund Site, upland source control investigations were guided by the 2005 EPA/DEQ Joint Source Control Strategy for Portland Harbor. The objective of a source control evaluation is to determine whether existing and potential sources of contamination at the site have been identified and if additional characterization or source control measures are needed. When stormwater is a

potential pathway to mobilize contamination from the site to the river, these determinations generally rest upon demonstrating that site-related information provides sufficient support to make the following findings:

1. Existing and potential facility-related contaminant sources have been identified and characterized.
2. Contaminant sources were removed or are being controlled to the extent feasible.
3. Performance monitoring conducted after source control measures were implemented supports the conclusion that the measures are effective.
4. Adequate measures are in place to ensure source control and good stormwater management measures occur in the future (DEQ 2010).

The site is located approximately half a mile west of the Willamette River. Site groundwater is assumed to be located approximately 22 to 28 feet below ground surface, as found at the adjacent site. There are no interior floor drains within the buildings that could contribute to groundwater, contaminant impacts to site soil were limited in depth to 2 to 3 feet below ground surface, contaminants detected in site soils have limited ability to transition between media and the site lies half a mile from the river. For these reasons, the groundwater pathway was excluded from source control evaluation. Therefore, stormwater was the only pathway evaluated at the site for source control.

#### **4.3.1 Lines of Evidence Evaluation**

The site lacks stormwater collection and conveyance features, apart from drains from painted steel roofs directed to the street and a single north lot trench drain and catch basin to a non-functioning conveyance pipe. Therefore, potentially erodible soils on the site were investigated as to the potential for overland flow of stormwater to transport contaminants from the north and south gravel lots to the street and subsequently into the City conveyance system, which eventually discharges to the Willamette River through City Outfall 19.

The Brazil and Phase II shallow soils sampling events provided results that were adequate to characterize potential sources that could be transported from the site, as shown in **Tables 1 through 4**.

In the south lot, lead and PCBs were found in two and one samples, respectively, at concentrations slightly exceeding Portland Harbor screening level values. In the north lot, several sampling points exceeded SLVs for arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc and PCBs. In addition, the north lot catch basin sediment exceeded SLVs for arsenic, cadmium, copper, lead, mercury, zinc and PCBs.

Because contaminants that were detected in one or more samples at concentrations exceeding applicable JSCS upland source control screening values, concentrations were compared to DEQ charts from *Appendix E: Tools for Evaluating Stormwater Data* found in DEQ 2010. This tool was created by compiling contaminant concentration data from many of the stormwater and stormwater solids samples collected at Portland Harbor-area heavy industrial sites. This data was used to create a series of charts that plot rank-order samples against contaminant concentrations, and are used to identify contaminant concentrations in samples that are atypically elevated. Concentrations falling within the upper/steeper portion of the curve are an indication that uncontrolled contaminant sources may be present at the site and that additional evaluation or source control measures may be needed. Concentrations that fall on the lower/flatter portion of the curve suggest that stormwater is not being unusually impacted by contaminants at the site, and while concentrations may exceed the risk-based SLVs, they are within the range found in stormwater from active industrial sites in Portland Harbor.

In the south lot, concentrations of the two contaminants that exceeded SLVs fell on the flatter part of the associated rank-order curves of concentrations found in stormwater solids at other heavy industrial sites in Portland Harbor. It is important to note that these are site soil samples, rather than solids that had been mobilized and concentrated by a stormwater collection system and that few contaminants were found at relatively low concentrations. In addition, and the City stormwater line immediately in front of the property was abandoned, significantly diminishing the potential for any non-infiltrated runoff to be transported to the river. To prevent erosion of soils in the southern forested area and south lot from entering the City conveyance, Brazil installed jute matting and plantings in the southernmost 1/3 of the south lot, which gradually slopes down and borders the drainage flowing through that lot. These facts add up to strong lines of evidence that source control is not warranted in the south lot.

In the north lot, several of the soil and catch basin solids samples that exceeded SLVs, also fell on the steeper portion of the rank-order curves, indicating that source control was warranted in this area of the site.

The abandonment of the stormwater line and soil removal in the north lot, as described above in Section 4.2.3 of this memorandum, was an appropriate action to eliminate the potential for contaminated soils to be transported from the site to the river through the City conveyance system serving City Outfall 19. Effectiveness of this measure was demonstrated by the lower concentrations of contaminants in post-excavation sampling and by isolation of lower residual contaminants by geotechnical fabric and approximately 22 inches of gravel backfill. As demonstrated by observations during unusually heavy rainfalls resulting in saturation conditions between October 2015 and January 2016, stormwater now infiltrates on site in clean gravel. Further, in the event that rainfall and saturation conditions intensify, any overland flow to the street conveyance system would occur without contacting contaminated soil.

#### **4.3.2 Source Control Decision**

Based on review of the file, DEQ concludes that this upland site is adequately characterized and soil removal eliminated the potential for stormwater to transport contaminants from the site. The property does not appear to be a current or reasonably likely future source of contamination to the Willamette River.

#### **5.0 References**

Coles Environmental Consulting, Inc. 2013. *Draft Work Plan for Additional Site Characterization of Shallow Soils*. June 30, 2013.

Coles Environmental Consulting, Inc. 2012. *Source Control and Stormwater Control Work Plan for Brazil Motors and Controls*. December 20, 2012.

Coles Environmental Consulting, Inc. 2011. *Results for Shallow Soil Sampling at the Brazil Motors and Controls Site*. July 7, 2011.

City of Portland, Bureau of Environmental Services. 2010. *Source Investigation Update Report City of Portland Outfall Basin 19*. June 2010.

City of Portland, Bureau of Environmental Services. 2007. *Stormwater System Investigation PGE-Forest Park Property (ECSI No. 2406)*. May 18, 2007.

DEQ. 2013. Fact Sheet: *Background Levels of Metals for Soils in Cleanups*.  
<http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf>

DEQ. 2010. *Guidance for Evaluating the Stormwater Pathway at Upland Sites*. October 2010.  
<http://www.deq.state.or.us/lq/cu/stmwtrguidance.htm>

DEQ and USEPA. 2005. *Portland Harbor Joint Source Control Strategy*. December 2005.  
<http://www.deq.state.or.us/lq/cu/stmwtrguidance.htm>

GeoDesign, Inc. 2014. *Phase II Environmental Site Assessment for Brazil Motors Brownfield Project*. Prepared for City of Portland Bureau of Environmental Services, City of Portland Brownfield Program and Brazil Motors and Controls, Inc. September 2, 2014.

Terra Hydr Inc. 2015. *Voluntary Cleanup Pathway Final Report for Brazil Motors and Control*. October 1, 2015.

Wohlers Environmental Services, Inc. 2013. *Stormwater Source Control Evaluation Report for Undeveloped Property Tax Lot 200*. Prepared for Anderson Portland Properties, LLC. June 17, 2013.



FIGURE 1: SITE LOCATION AND LAYOUT

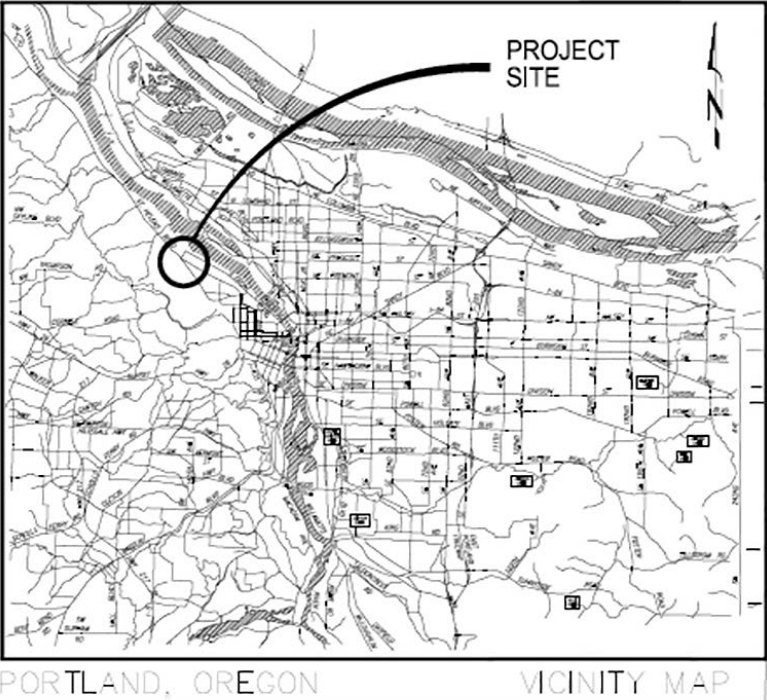
# BRAZIL MOTOR & CONTROLS

## 4315 NW ST. HELENS ROAD



**Legend**

- Property Lines
- Existing Contours
- Chain Link Fence
- Sediment Fence
- Brazil Motors Building
- Catch Basin
- Trench Drain
- Asphalt
- Area to Be Planted



**HOLTECH** Civil and Environmental Engineering  
31150 NE Schmale Rd. Newberg, OR 97132 phone 503-538-6900

**BRAZIL MOTORS REMEDIATION**  
TITLE PAGE GENERAL DETAILS

REGISTERED PROFESSIONAL ENGINEER 14,601  
ROBERT B. ROHOLT  
Expires 12/31/14

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FIGURE 2: CITY STORMWATER CONVEYANCE SYSTEM

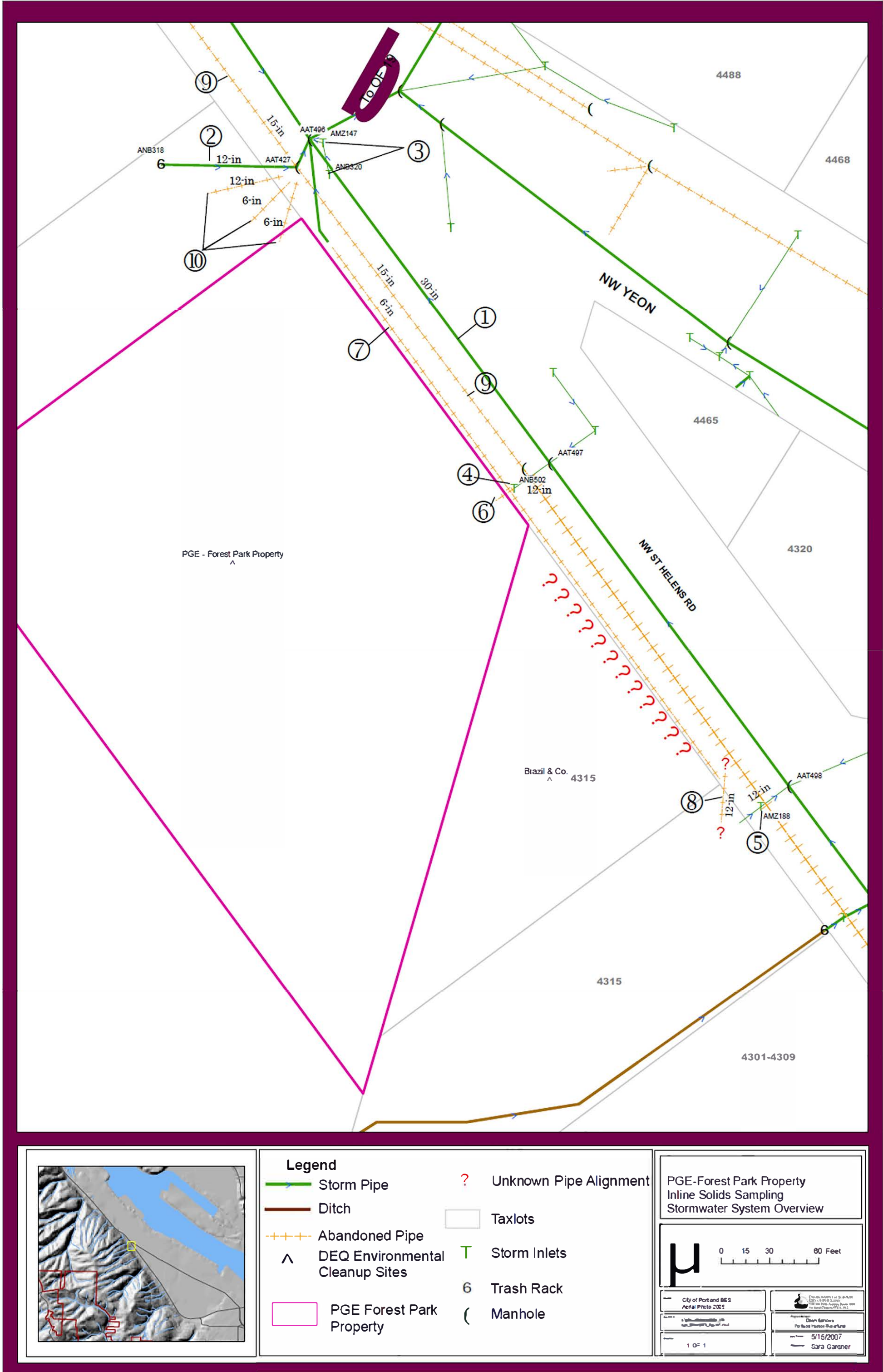


FIGURE 3: BRAZIL SOIL SAMPLING 2011

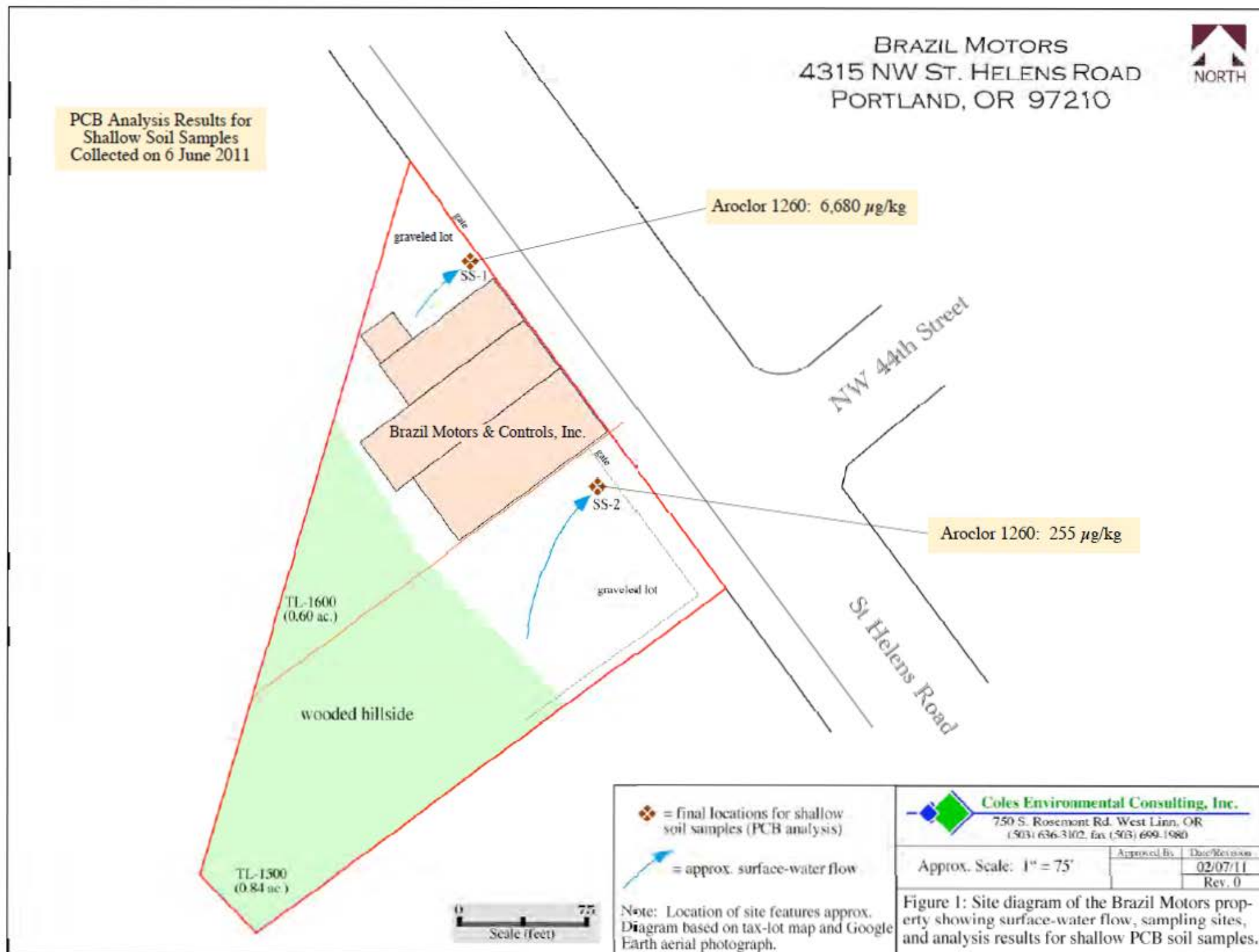
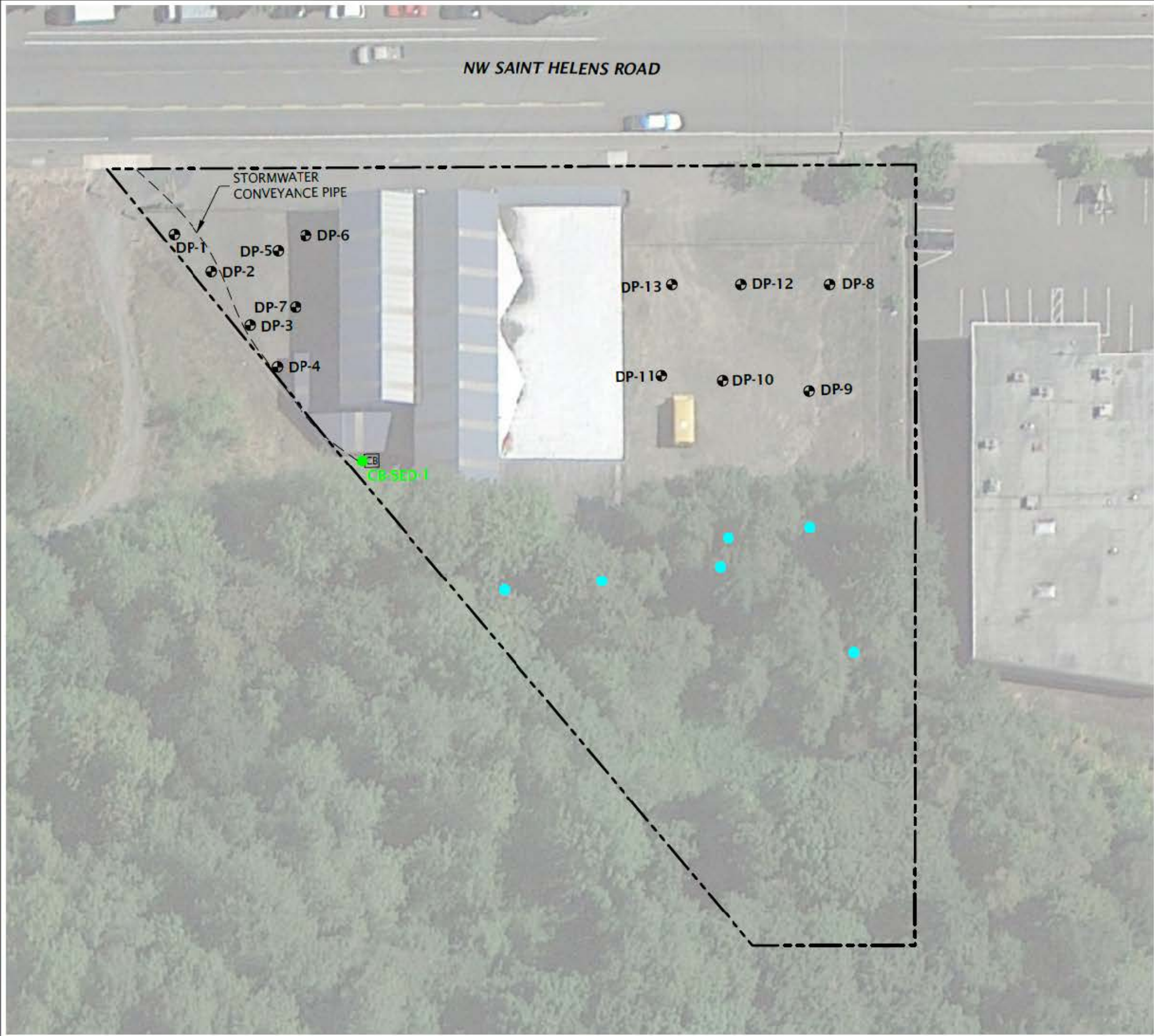


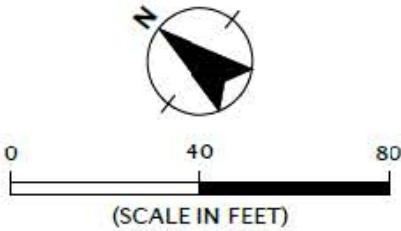


FIGURE 4: PHASE II SOIL SAMPLING 2014

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- LEGEND:**
- DP-1  BORING (GEODESIGN, MAY 7, 2014)
  -  CATCH BASIN/TRENCH DRAIN
  - PROJECT SITE BOUNDARY
  - CB-SED-1  CATCH BASIN SEDIMENT SAMPLE (GEODESIGN, MAY 7, 2014)
  -  SURFACE SOIL SAMPLE (APPROXIMATE) BY GEODESIGN, MAY 7, 2014. COMPOSITED INTO SOIL SAMPLE SS-1(0-0.5).



SITE PLAN BASED ON AERIAL PHOTOGRAPH  
OBTAINED FROM GOOGLE EARTH PRO®,  
DECEMBER 17, 2013

SITE PLAN	
PORTBES-24-02	BRAZIL MOTORS PROPERTY BROWNFIELD PROJECT PORTLAND, OR
SEPTEMBER 2014	

**GEODESIGN**  
15575 SW Sequoia Parkway - Suite 100  
Portland, OR 97224  
OR 503.908.8787 FAX 503.908.5008

# TABLE 1: PHASE II SOIL SAMPLING RESULTS 2014 (page 1)

Summary of Soil and Sediment Chemical Analytical Results <sup>1</sup> Total Metals and TCLP Metals Brazil Motors Property Brownfields Project 4315 NW St. Helens Road Portland, Oregon													
Sample I.D. (depth in feet)	Sample Date	Total Metals by EPA 6000/7000 Series Methods (mg/kg)									TCLP Metals by EPA Method 6010C (mg/L)		
		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	Arsenic	Chromium	Lead
SS-1(0-0.5)	05/07/14	7.54	0.507	26.2	27.2	53.5	0.048	16.1	0.20 J	136	--	--	--
CB-SED-1	05/07/14	140	2.32	61.8	425	840	0.142	28.0	0.42 J	1,630	0.025	--	0.214
DUP-DP-1(0-1)	05/07/14	4.72	0.362	31.0	20.2	9.63	0.029	19.2	0.23 J	149	--	--	--
DP-1(0-1)	05/07/14	3.73	0.349	26.9	19.0	12.2	0.027	16.9	0.20 J	141	--	--	--
DP-1(2.5-3.5)	05/07/14	--	--	--	--	--	--	--	--	--	--	--	--
DP-2(0-1)	05/07/14	375	4.470	147	543.0	1,140	0.180	62.0	0.59 J	2,850	0.09	0.055	0.666
DP-2(2-3)	05/07/14	2.85	--	22.4	--	8.24	--	--	--	59.3	--	--	--
DP-3(0.5-1.5)	05/07/14	42.0	4.670	72.1	173	5,220	0.097	36.2	0.62 J	1,650	--	--	5.1
DP-3(2-3)	05/07/14	2.48	--	--	--	8.62	--	--	--	61.4	--	--	--
DP-4(0-1)	05/07/14	62.7	11.6	106	201	700	0.207	29.0	0.41 J	1,300	--	--	0.198
DP-4(2-3)	05/07/14	3.16	--	--	--	11.4	--	--	--	60.6	--	--	--
DP-5(0.5-1.5)	05/07/14	13.6	4.3	119	110.0	568	0.345	28.8	0.49 J	613	--	0.064	0.855
DP-5(2-3)	05/07/14	3.06	--	24.4	--	13.0	--	--	--	--	--	--	--
DP-6(0.5-1.5)	05/07/14	57.5	1.21	60.6	200	705	0.080	36.7	0.27 J	671	--	--	0.399
DP-6(2-3)	05/07/14	1.91	--	--	--	6.5	--	--	--	--	--	--	--
DP-7(0.5-1.5)	05/07/14	19.2	2.63	35.8	155	772	0.332	23.0	0.22 J	3,240	--	--	0.062
DP-7(2-3)	05/07/14	2.2	--	--	--	8.77	--	--	--	49.5	--	--	--
DP-8(0.5-1.5)	05/07/14	5.28	0.177	25.1	27.3	12.6	0.069	20.4	0.13 J	90.0	--	--	--
DP-8(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--	--	--
DP-9(1.5-2.5)	05/07/14	7.04	0.373	24.1	55.1	40.9	0.065	13.9	0.15 J	138	--	--	--
DP-9(2.5-3.5)	05/07/14	--	--	--	--	--	--	--	--	--	--	--	--
DP-10(0.5-1.5)	05/07/14	6.78	0.149	25.8	24.5	11.9	0.020	16.3	0.10 J	73.9	--	--	--
DP-10(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--	--	--
DP-11(0.5-1.5)	05/07/14	6.77	0.389	36.5	34.7	33.0	0.031	14.3	0.16 J	120	--	--	--
DP-11(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--	--	--
DP-12(0-1)	05/07/14	4.40	0.302	25.3	32.2	34.5	0.029	14.0	0.13 J	94.1	--	--	--
DP-12(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--	--	--
DP-13(1-2)	05/07/14	8.26	0.432	18.9	34.6	77.8	0.047	10.5	0.13 J	141	--	--	--
DP-13(2-3.5)	5/7/2014	--	--	--	--	--	--	--	--	--	--	--	--
Previously Completed Sampling Results, Coles Environmental Consultants, June 6, 2011													
SS-1	06/06/11	6.88	13.2	115	86.7	7.61	0.124	100	12.4	938	--	--	--
SS-2	06/06/11	8.97	ND<1.22	21.1	69.3	151	ND<0.095	10.8	ND<2.44	178	--	--	--



# TABLE 1: PHASE II SOIL SAMPLING RESULTS 2014 (page 2)

Summary of Soil and Sediment Chemical Analytical Results <sup>1</sup> Total Metals and TCLP Metals Brazil Motors Property Brownfields Project 4315 NW St. Helens Road Portland, Oregon													
Sample I.D. (depth in feet)	Sample Date	Total Metals by EPA 6000/7000 Series Methods (mg/kg)									TCLP Metals by EPA Method 6010C (mg/L)		
		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	Arsenic	Chromium	Lead
<b>JS06 Upland Soil/Sediment Screening Value</b>													
MacDonald PEC and Other SQVs		33	4.98	111	149	128	1.06	48.6	5	459	NE	NE	NE
2007 DEQ Bioaccumulative Sediment SLVs		7	1	NE	NE	17	0.07	NE	2	NE	NE	NE	NE
<b>DEQ Generic RBCs<sup>2</sup></b>													
<b>Soil Ingestion, Dermal Contact, and Inhalation</b>													
Residential		0.39	39	120,000	3,100	400	23	1,500	NE	NE	NE	NE	NE
Urban Residential		1	78	230,000	6,200	400	47	3,100	NE	NE	NE	NE	NE
Occupational		1.7	510	>Max	41,000	800	310	20,000	NE	NE	NE	NE	NE
Construction Worker		13	150	460,000	12,000	800	93	6,100	NE	NE	NE	NE	NE
Excavation Worker		370	4,300	>Max	340,000	800	2,600	170,000	NE	NE	NE	NE	NE
<b>Volatilization to Outdoor Air</b>													
Residential		NV	NV	NV	NV	NV	NV	NV	NE	NE	NE	NE	NE
Urban Residential		NV	NV	NV	NV	NV	NV	NV	NE	NE	NE	NE	NE
Occupational		NV	NV	NV	NV	NV	NV	NV	NE	NE	NE	NE	NE
<b>Vapor Intrusion into Buildings</b>													
Residential		NV	NV	NV	NV	NV	NV	NV	NE	NE	NE	NE	NE
Urban Residential		NV	NV	NV	NV	NV	NV	NV	NE	NE	NE	NE	NE
Occupational		NV	NV	NV	NV	NV	NV	NV	NE	NE	NE	NE	NE
<b>Leaching to Groundwater</b>													
Residential		*	*	*	*	30	*	*	NE	NE	NE	NE	NE
Urban Residential		*	*	*	*	30	*	*	NE	NE	NE	NE	NE
Occupational		*	*	*	*	30	*	*	NE	NE	NE	NE	NE
DEQ Clean Fill Criteria <sup>3</sup>		8.8	0.63	76	34.0	28	0.23	47	0.71	180	NE	NE	NE
Notes: 1. Chemical analyses performed by ALS of Kelso, Washington, under contract to BES. 2. Generic RBCs for soil as presented in DEQ's RBC tables dated September 2009, updated June 7, 2012. 3. DEQ Clean Fill Screening Criteria dated July 23, 2014 (Portland Basin) -- : not analyzed *: Leaching to groundwater RBCs are not provided for inorganic chemicals. If this pathway is of concern, then site-specific leaching tests must be performed. J: the result is an estimated value ND: not detected above the laboratory MDL NV: chemical is considered non-volatile Bolding indicates analyte detection. Shading indicates concentration exceeding one or more screening level values.													



# TABLE 2: PHASE II SOIL SAMPLING RESULTS 2014 (page 1)

Summary of Soil and Sediment Chemical Analytical Results <sup>1</sup> Diesel- and Residual-Range Organics and PCBs Brazil Motors Property Brownfield Project 4315 NW St. Helens Road Portland, Oregon											
Sample I.D. (depth in feet)	Sample Date	Diesel- and Residual-Range Organics by Method NWTPH-Dx (mg/kg)		PCBs by EPA Method 8082A (µg/kg)							
		Diesel-Range	Residual-Range	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
SS-1(0-0.5)	05/07/14	20 J	330	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	26	20	46
CB-SED-1	05/07/14	250	2,100	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	72	120	192
DUP-DP-1(0-1)	05/07/14	9.0 J	74 J	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND
DP-1(0-1)	05/07/14	4.2 J	20 J	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND
DP-1(2.5-3.5)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-2(0-1)	05/07/14	99	630	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	650	1,700	2,350
DP-2(2-3)	05/07/14	--	--	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND
DP-3(0.5-1.5)	05/07/14	130	770	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	26	76	102
DP-3(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-4(0-1)	05/07/14	320	1,300	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	130	910	1,040
DP-4(2-3)	05/07/14	--	--	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND
DP-5(0.5-1.5)	05/07/14	61	460	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	79	340	419
DP-5(2-3)	05/07/14	--	--	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	16	16
DP-6(0.5-1.5)	05/07/14	130	1,100	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	29	89	118
DP-6(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-7(0.5-1.5)	05/07/14	68	630	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	12	61	73
DP-7(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-8(0.5-1.5)	05/07/14	11 J	21 J	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	3.6 J	3.6 J
DP-8(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-9(1.5-2.5)	05/07/14	19 J	120 J	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	8.3	17	25.3
DP-9(2.5-3.5)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-10(0.5-1.5)	05/07/14	7.3 J	56 J	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND
DP-10(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-11(0.5-1.5)	05/07/14	84	520	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	9.7	20	29.7
DP-11(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-12(0-1)	05/07/14	73	210	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	15	26.0	41
DP-12(2-3)	05/07/14	--	--	--	--	--	--	--	--	--	--
DP-13(1-2)	05/07/14	72	320	ND<2.1	ND<2.1	ND<2.1	ND<2.1	ND<2.1	31	69	100
DP-13(2-3.5)	5/7/2014	--	--	--	--	--	--	--	--	--	--

# TABLE 2: PHASE II SOIL SAMPLING RESULTS 2014 (page 2)

Summary of Soil and Sediment Chemical Analytical Results <sup>1</sup> Diesel- and Residual-Range Organics and PCBs Brazil Motors Property Brownfield Project 4315 NW St. Helens Road Portland, Oregon											
Sample I.D. (depth in feet)	Sample Date	Diesel- and Residual-Range Organics by Method NWTPH-Dx (mg/kg)		PCBs by EPA Method 8082A (µg/kg)							
		Diesel-Range	Residual-Range	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Previously Completed Sampling Results, Coles Environmental Consultants, June 6, 2011											
SS-1	06/06/11	--	--	ND<166	ND<166	ND<166	ND<166	ND<166	ND<166	6,680	6,680
SS-2	06/06/11	--	--	ND<65.8	ND<65.8	ND<65.8	ND<65.8	ND<65.8	ND<65.8	255	255
JSCS Upland Soil/Sediment Screening Value											
MacDonald PEC and Other SQVs		NE	NE	530	NE	NE	NE	1,500	300	200	NE
2007 DEQ Bioaccumulative Sediment SLVs		NE	NE	NE	NE	NE	NE	NE	NE	NE	0.39
DEQ Generic RBCs <sup>2</sup>											
Soil Ingestion, Dermal Contact, and Inhalation											
Residential		1,100	NE	NE	NE	NE	NE	NE	NE	NE	200
Urban Residential		2,500	NE	NE	NE	NE	NE	NE	NE	NE	310
Occupational		20,000	NE	NE	NE	NE	NE	NE	NE	NE	560
Construction Worker		9,700	NE	NE	NE	NE	NE	NE	NE	NE	4,400
Excavation Worker		>Max	NE	NE	NE	NE	NE	NE	NE	NE	120,000
Volatilization to Outdoor Air											
Residential		5,900	NE	NE	NE	NE	NE	NE	NE	NE	>Csat
Urban Residential		5,900	NE	NE	NE	NE	NE	NE	NE	NE	>Csat
Occupational		69,000	NE	NE	NE	NE	NE	NE	NE	NE	>Csat
Vapor Intrusion into Buildings											
Residential		94	NE	NE	NE	NE	NE	NE	NE	NE	>Csat
Urban Residential		94	NE	NE	NE	NE	NE	NE	NE	NE	>Csat
Occupational		>Max	NE	NE	NE	NE	NE	NE	NE	NE	>Csat
Leaching to Groundwater											
Residential		31	NE	NE	NE	NE	NE	NE	NE	NE	110
Urban Residential		31	NE	NE	NE	NE	NE	NE	NE	NE	550
Occupational		130	NE	NE	NE	NE	NE	NE	NE	NE	620
DEQ Clean Fill Criteria <sup>3</sup>		1,100	NE	NE	NE	NE	NE	NE	NE	NE	200

## Notes:

1. Chemical analyses performed by ALS of Kelso, Washington, under contract to BES.
2. Generic RBCs for soil as presented in DEQ's RBC tables dated September 2009, updated June 7, 2012.
3. DEQ Clean Fill Screening Criteria dated July 23, 2014 (Portland Basin)

--: not analyzed

>Max: The constituent RBC for this pathway is greater than 100,000 mg/kg. DEQ believes it is highly unlikely that such concentrations will ever be encountered.

ND: not detected above the laboratory MDL

Bolding indicates analyte detection.

Shading indicates concentration exceeding one or more screening level values

>Csat: The soil RBC exceeds the limit of three-phase equilibrium partitioning. Refer to Appendix D of DEQ's RBC guidance document for the corresponding value of Csat. Soil concentrations in excess of Csat indicate that free product might be present. See Section B.2.1.4 of DEQ's RBC guidance document for additional information.

| |: the result is an estimated value

TABLE 3: PHASE II SOIL SAMPLING RESULTS 2014 (page 1)

Summary of Soil and Sediment Chemical Analytical Results SVOCs Brazil Motors Property Brownfield Project 4315 NW St. Helens Road Portland, Oregon																									
Sample ID, (depth in feet)	Sample Date	SVOCs by EPA Method 8270D (ug/kg)																							
		Naphthalene	2-Methylnaphthalene	Acenaphthylene	Dimethyl Phthalate	Acenaphthene	Dibenzofuran	Fluorene	Diethyl Phthalate	Phenanthrene	Anthracene	D-n-butyl Phthalate	Fluoranthene	Pyrene	Buryl Benzyl Phthalate	Benz(a)anthracene	Chrysene	Bis(2-ethylhexyl) Phthalate	Di-n-octyl Phthalate	Benzofluoranthene	Benzofluoranthene	Benzofluoranthene	Indeno(1,2,3-cd)pyrene	Di-benz(a,h)anthracene	Benzofluoranthene
SS-1(0-0.5)	05/07/14	ND<37	ND<37	NND<37	ND<37	ND<37	ND<37	ND<37	ND<37	35 J	ND<37	62 J	74	78	ND<37	41	53	170 J	ND<37	89	23 J	74	63	ND<37	69
C&SED-1	05/07/14	ND<87	ND<87	ND<87	ND<87	ND<87	ND<87	ND<87	ND<87	78 J	ND<87	300	180	180	70 J	100	150	500 J	ND<87	210	48 J	140	140	ND<87	160
DUP-DP-1(0-1)	05/07/14	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	5.1 J	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3
DP-1(0-1)	05/07/14	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	5.4 J	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3
DP-1(2.5-3.5)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-2(0-1)	05/07/14	ND<56	ND<56	42 J	ND<56	ND<56	ND<56	ND<56	ND<56	85	34 J	890	190	200	ND<56	130	160	330 J	ND<56	210	76	180	160	ND<56	150
DP-2(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-3(0.5-1.5)	05/07/14	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	230	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	ND<58	39 J	ND<58	ND<58	34 J	ND<58	43 J
DP-3(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-4(0-1)	05/07/14	ND<63	ND<63	30 J	ND<63	ND<63	ND<63	ND<63	ND<63	56 J	ND<63	800	120	130	ND<63	67	92	260 J	ND<63	160	43 J	120	140	ND<63	150
DP-4(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-5(0.5-1.5)	05/07/14	ND<55	ND<55	ND<55	ND<55	ND<55	ND<55	ND<55	ND<55	75	ND<55	230	140	150	ND<55	79	100	96 J	ND<55	140	40 J	120	120	ND<55	130
DP-5(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-6(0.5-1.5)	05/07/14	46 J	ND<59	ND<59	ND<59	70	ND<59	50 J	ND<59	400	97	240	470	420	ND<59	170	210	ND<590	ND<59	230	74	230	180	ND<59	180
DP-6(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-7(0.5-1.5)	05/07/14	ND<57	ND<57	ND<57	ND<57	ND<57	ND<57	ND<57	ND<57	41 J	ND<57	450	74	63	ND<57	ND<57	47 J	710	ND<57	75	ND<57	45 J	47 J	ND<57	55 J
DP-7(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-8(0.5-1.5)	05/07/14	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	10 J	6.4	6.4	6.3	ND<6.0	4.8 J	33 J	ND<6.0	6.0	ND<6.0	5.7 J	6.6	ND<6.0	6.5
DP-8(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-9(1.5-2.5)	05/07/14	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	ND<6.0	23	3.5 J	19	43	35	12	17	24	170	ND<6.0	31	9.3	24	20	3.6 J	20
DP-9(2.5-3.5)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-10(0.5-1.5)	05/07/14	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	7.1 J	ND<6.3	ND<6.3	5.7 J	ND<6.3	ND<6.3	34 J	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3
DP-10(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-11(0.5-1.5)	05/07/14	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<120	45 J	60	180	38 J	48 J	2,000	ND<59	91	ND<59	91	92	ND<59	95
DP-11(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-12(0-1)	05/07/14	ND<12	ND<12	ND<12	ND<12	ND<12	ND<12	ND<12	ND<12	ND<12	ND<12	9.8 J	ND<12	ND<12	12	ND<12	ND<12	160	ND<12	10 J	ND<12	9.1 J	9.8 J	ND<12	11 J
DP-12(2-3)	05/07/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP-13(1-2)	05/07/14	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	ND<59	71	ND<59	ND<120	70	83	64	45 J	56 J	1,300	ND<59	77	ND<59	67	73	ND<59	73
DP-13(2-3.5)	5/7/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JSCS Upland Soil/Sediment Screening Value																									
MacDonald PEC and Other SQVs		561	200	200	NE	300	NE	536	600	1,170	845	100	2,230	1,520	NE	1,050	1,290	800	NE	NE	13,000	1,450	100	1,300	300
2007 DEQ Bioaccumulative Sediment SLVs		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	60	37,000	1,900	NE	NE	NE	330	NE	NE	NE	NE	NE	NE	NE

Summary of Soil and Sediment Chemical Analytical Results <sup>1</sup> SVOCs Brazil Motors Property Brownfield Project 4315 NW St. Helens Road Portland, Oregon																								
Sample I.D. (depth in feet)	Sample Date	SVOCs by EPA Method 8270.2 (µg/kg)																						
		Naphthalene	2-Methylnaphthalene	Acenaphthylene	Dimethyl Phthalate	Acenaphthene	Dibenzofuran	Fluorene	Diethyl Phthalate	Phenanthrene	Anthracene	D-n-butyl Phthalate	Fluoranthene	Pyrene	Butyl Benzyl Phthalate	Benz(a)anthracene	Chrysene	Bis(2-ethylhexyl) Phthalate	Di-n-octyl Phthalate	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benz(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene
<b>DEQ Generic RBCs<sup>2</sup></b>																								
<b>Soil Ingestion, Dermal Contact, and Inhalation</b>																								
Residential	4,600	NE	NE	NE	4.70E+06	NE	3.10E+06	NE	NE	2.30E+07	NE	2.30E+06	1.70E+06	NE	150	14,000	35,000	NE	150	1,500	15	150	15	NE
Urban Residential	25,000	NE	NE	NE	9.40E+06	NE	6.30E+06	NE	NE	4.70E+07	NE	4.60E+06	3.40E+06	NE	340	32,000	93,000	NE	340	3,400	34	340	34	NE
Occupational	23,000	NE	NE	NE	6.10E+07	NE	4.10E+07	NE	NE	3.10E+08	NE	2.90E+07	2.10E+07	NE	2,700	250,000	150,000	NE	2,700	27,000	270	2,700	270	NE
Construction Worker	580,000	NE	NE	NE	1.90E+07	NE	1.20E+07	NE	NE	9.30E+07	NE	8.90E+06	6.70E+06	NE	21,000	2.10E+06	1.20E+06	NE	21,000	210,000	2,100	21,000	2,100	NE
Excavation Worker	1,600,000	NE	NE	NE	5.20E+08	NE	3.40E+08	NE	NE	>Max	NE	2.50E+08	1.90E+08	NE	590,000	5.70E+07	3.30E+07	NE	590,000	5.90E+06	59,000	590,000	59,000	NE
<b>Volatilization to Outdoor Air</b>																								
Residential	6,500	NE	NE	NE	>Max	NE	>Max	NE	NE	>Max	NE	>Max	-	NE	NV	>Csat	NV	NE	>Csat	NV	NV	NV	NV	NE
Urban Residential	18,000	NE	NE	NE	>Max	NE	>Max	NE	NE	>Max	NE	>Max	-	NE	NV	>Csat	NV	NE	>Csat	NV	NV	NV	NV	NE
Occupational	99,000	NE	NE	NE	>Max	NE	>Max	NE	NE	>Max	NE	>Max	-	NE	NV	>Csat	NV	NE	>Csat	NV	NV	NV	NV	NE
<b>Vapor Intrusion into Buildings</b>																								
Residential	6,500	NE	NE	NE	>Max	NE	>Max	NE	NE	>Max	NE	>Max	-	NE	NV	>Csat	NV	NE	>Csat	NV	NV	NV	NV	NE
Urban Residential	18,000	NE	NE	NE	>Max	NE	>Max	NE	NE	>Max	NE	>Max	-	NE	NV	>Csat	NV	NE	>Csat	NV	NV	NV	NV	NE
Occupational	99,000	NE	NE	NE	>Max	NE	>Max	NE	NE	>Max	NE	>Max	-	NE	NV	>Csat	NV	NE	>Csat	NV	NV	NV	NV	NE
<b>Leaching to Groundwater</b>																								
Residential	87	NE	NE	NE	>Csat	NE	>Csat	NE	NE	>Csat	NE	>Csat	>Csat	NE	3,500	>Csat	140,000	NE	4,000	>Csat	900	>Csat	3,400	NE
Urban Residential	470	NE	NE	NE	>Csat	NE	>Csat	NE	NE	>Csat	NE	>Csat	>Csat	NE	10,000	>Csat	>Csat	NE	>Csat	>Csat	2,700	>Csat	>Csat	NE
Occupational	440	NE	NE	NE	>Csat	NE	>Csat	NE	NE	>Csat	NE	>Csat	>Csat	NE	>Csat	>Csat	>Csat	NE	>Csat	>Csat	>Csat	>Csat	>Csat	NE
<b>DEQ Clean Fill Criteria<sup>3</sup></b>																								
	87	310,000	NE	NE	29,000	2	29,000	100,000	NE	29,000	NE	29,000	1.70E+06	260,000	150	14,000	4,500	NE	150	1,100	15	150	15	NE

Notes:

- Chemical analyses performed by ALS of Kelso, Washington, under contract to BES.
- Generic RBCs for soil as presented in DEQ's RBC tables dated September 20

Shading indicates concentration exceeding one or more screening level value.



TABLE 4: POST-EXCAVATION SAMPLING RESULTS

Units	SLV for Portland Harbor	DP-1-615 µg/kg	DP-2-615 µg/kg	DP-3-615 µg/kg	DP-4-615 µg/kg	DP-5-615 µg/kg	DP-6-615 µg/kg	DP-7-615 µg/kg	DEQ Soil Occupational RBC
<b>Metals/Inorganics</b>									
Aluminum (pH 6.5 - 9.0)	--								
Antimony	64000								
Arsenic	7000	5480	4790	2690	1080	4170	15600	2480	1900
Arsenic III	--								
Cadmium	1000	2630	574	956	1630	1020	1540	1120	1100000
Chromium, total	111000	31000	23500	27400	27600	28200	22300	21900	6300 (IV)
Chromium, hexavalent	--								
Copper	149000								
Lead	17000	221000	18000	123000	69300	158000	127000	240000	800000
Manganese	1100000								
Mercury	70	160	ND	ND	ND	ND	ND	ND	310000
<b>PCBs Aroclors (total)</b>									
	(0.39)	(30.3)	(62.9)	(812)	(148.1)	(49.3)	(1484)	(ND)	(590)
Aroclor 1016	530	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1221	--	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1232	--	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1242	--	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1248	1500	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1254	200	14.2	29.8	ND	45.1	ND	732	ND	
Aroclor 1260	300	16.1	33.1	812	103	49.3	752	ND	
<b>Polycyclic Aromatic Hydrocarbons (total)</b>									
	(**)	(292.1)	(28.6)	(165.3)	(ND)	(4550)	(1553.9)	(ND)	
Naphthalene	561	14.6	28.6	26.4	ND	168	100	ND	23000
2-Methylnaphthalene	200	ND	ND	ND	ND	31.3	29.8	ND	--
Acenaphthylene	200	ND	ND	ND	ND	77	19.2	ND	--
Acenaphthene	300	ND	ND	ND	ND	ND	ND	ND	70000000
Fluorene	536	ND	ND	ND	ND	ND	ND	ND	47000000
Phenanthrene	1170	15.7	ND	14.1	ND	113	102	ND	--
Anthracene	845	ND	ND	ND	ND	45.5	15.8	ND	350000000
Fluoranthene	2230	38.2	ND	22.8	ND	584	196	ND	30000000
Pyrene	1520	47	ND	23.2	ND	709	243	ND	23000000
Benz(a)anthracene	1050	19.5	ND	15.2	ND	382	82.5	ND	2900
Chrysene	1290	30.3	ND	ND	ND	436	124	ND	290000
Benzo(b)fluoranthene	--	40	ND	18.7	ND	513	146	ND	2900
Benzo(k)fluoranthene	13000	12.8	ND	ND	ND	182	38.6	ND	29000
Benzo(a)pyrene	1450	31.3	ND	15.6	ND	469	136	ND	290
Indeno(1,2,3-cd)pyrene	100	39.2	ND	13.7	ND	366	131	ND	2900
Dibenz(a,h)anthracene	1300	ND	ND	ND	ND	54.2	13	ND	290
Benzo(g,h,i)perylene	300	50.5	ND	15.6	ND	420	177	ND	--
<b>Other Analytes</b>									
TPH Diesel	--	ND	ND	ND	ND	ND	ND	ND	14000000
TPH Heavy Oil	--	ND	ND	167	ND	105	144	ND	